

# Derivation of long-term diversion limit equivalent factors

Queensland Murray–Darling Basin

February 2020



This publication has been compiled by Water Policy of the Department of Natural Resources, Mines and Energy

© State of Queensland, 2020

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (February 2020) and may not be accurate, current or complete. The State of Queensland (including the Department of Natural Resources, Mines and Energy), the author and publisher take no responsibility and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice relating to the material contained in this publication.

The Queensland Government supports and encourages the dissemination and exchange of its information. The copyright in this publication is licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence.



Under this licence you are free, without having to seek our permission, to use this publication in accordance with the licence terms. You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication.

Note: Some content in this publication may have different licence terms as indicated.

For more information on this licence, visit <https://creativecommons.org/licenses/by/4.0/>.

The information contained herein is subject to change without notice. The Queensland Government shall not be liable for technical or other errors or omissions contained herein. The reader/user accepts all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from using this information.

**Interpreter statement:**

The Queensland Government is committed to providing accessible services to Queenslanders from all culturally and linguistically diverse backgrounds. If you have difficulty in understanding this document, you can contact us within Australia on 13QGOV (13 74 68) and we will arrange an interpreter to effectively communicate the report to you.



## Table of contents

<b>Glossary</b> .....	<b>1</b>
<b>Introduction</b> .....	<b>2</b>
Background .....	2
Purpose of this report.....	2
<b>Queensland water entitlements</b> .....	<b>3</b>
Description of water entitlement classes.....	3
Changes in water entitlement class shares .....	4
<b>Planning assumptions</b> .....	<b>4</b>
<b>How the 2019 factors were determined</b> .....	<b>5</b>
Introduction to long-term diversion limit equivalent factors.....	5
Underlying principles.....	5
Data and knowledge .....	5
Models.....	6
Method .....	6
Summary of 2019 long-term diversion limit equivalent factors .....	8
Updated water recovery estimates .....	10
<b>Change in water recovery volumes</b> .....	<b>12</b>
<b>Amended water recovery targets</b> .....	<b>14</b>
<b>Implications for water recovery</b> .....	<b>15</b>
<b>Conclusions</b> .....	<b>17</b>
<b>References</b> .....	<b>17</b>

## Glossary

Term	Definition
2011 factors	Long-term diversion limit equivalent (LTDLE) factors v2.05, at November 2011, as noted by the Murray–Darling Basin Ministerial Council.
2019 factors	Long-term diversion limit equivalent (LTDLE) factors determined by the Department of Natural Resources, Mines and Energy that reproduce the share of the Basin Plan BDL for each class of water access entitlement in the Condamine-Balonne, Queensland Border Rivers, Moonie, Warrego, Paroo and Nebine SDL resource units.
annual allocation	Means the specific volume of water allocated to a water access entitlement in a given water accounting period. Under s.4 <i>Water Act 2007</i> (Cth) this is a water allocation. To avoid confusion with the same term under Queensland state water management law ( <i>Water Act 2000</i> (Qld)), annual allocation is used rather than water allocation.
Basin Plan	Murray–Darling Basin Plan 2012
BDL	Baseline diversion limit under the Basin Plan
Cap	The Murray–Darling Basin Cap on diversions under Schedule E to the former Murray-Darling Basin Agreement
LTDLE factors	Long-term diversion limit equivalent factors
MDBA	Murray–Darling Basin Authority
QMDB	Queensland part of the Murray–Darling Basin
SDL	Sustainable diversion limit under the Basin Plan
SDL resource unit	The water resources, or particular parts of the water resources, of a WRP area that is either a surface water SDL resource unit or groundwater SDL resource unit under the Basin Plan.
water access entitlement	Means an entitlement, by or under a law of a State, to exclusive access to a share of the water resources of a WRP area. As defined in s.4 <i>Water Act 2007</i> (Cth).
water allocation	Water Allocation — tradable water access entitlement with a Nominal Volume (share of the available water resource) and volumetric limit (maximum diversion limit). It may be supplemented (in a water supply scheme) or unsupplemented (from natural flow events outside of a scheme). As defined under <i>Water Act 2000</i> (Qld).
water plan	Queensland statutory plan for the sustainable allocation and management of water resources made under <i>Water Act 2000</i> (Qld)
WRP	Water resource plan under the Basin Plan comprising a number of texts and instruments that implement the Basin Plan. The water plan is the main component of Queensland’s WRPs.

# Introduction

## Background

The Murray–Darling Basin Plan 2012 (Basin Plan) sets out the volume of water entitlements that the Australian Government is required to recover for the environment from existing water users. There are over 150 different classes of water entitlements in the Murray–Darling Basin, each having different rules that determine how much water they can extract or divert. Long-term diversion limit equivalent (LTDLE) factors (also known as cap factors) were developed to determine the contribution on equal terms of each water entitlement recovered towards the Basin Plan’s water recovery target.

LTDLE factors were initially developed and subsequently agreed by the Murray–Darling Basin Ministerial Council in 2011. These original factors, i.e. 2011 factors, were based on information available at the time, including hydrologic models.

In the Queensland part of the Murray–Darling Basin (QMDB), new hydrologic models have been developed based on updated streamflow and climate data and improved modelling techniques to support the new Water Plans under the *Water Act 2000* (Qld). The models were independently peer-reviewed and form part of the water resource plans (WRPs) that were accredited under the *Water Act 2007* (Cth) as consistent with the Basin Plan. The accredited WRPs are:

- Warrego–Paroo–Nebine WRP — accredited June 2017
- Condamine–Balonne WRP — accredited September 2019
- Queensland Border Rivers–Moonie WRP — accredited September 2019

## Purpose of this report

This report meets an agreed outcome of a Murray–Darling Basin Ministerial Council in May 2015 that each Basin state would work with the Murray–Darling Basin Authority (MDBA) to settle planning assumptions for each Basin valley, ahead of the sustainable diversion limits taking effect in July 2019. Timely completion of this work will help to determine the Australian Government’s remaining water recovery task.

This report summarises how the revised LTDLE factors (2019 factors) were derived for the surface water and groundwater SDL resource units within the QMDB where water recovery is required and will support the Australian Government’s water recovery program. The report:

- describes the methodology using a consistent set of planning assumptions to develop the 2019 factors
- sets out the share of the baseline diversion limit (BDL) and 2019 factors for each entitlement class in the relevant SDL resource units
- summarises the revised estimate of the water recovery volumes required to achieve the SDL for that particular SDL resource unit

The new hydrologic models and other non-modelled methods in Queensland’s accredited WRPs have derived a new estimate of the BDLs in collaboration with the MDBA. Other documents in the WRPs provide complementary information to this report about the re-estimation of the BDLs and demonstrate that the annual permitted take will achieve the SDL in a WRP area over the long term. These documents are listed in the references chapter.

# Queensland water entitlements

## Description of water entitlement classes

The tables in this report assign 2019 factors to a number of water entitlement classes that are suitable to be considered for the Australian Government's water recovery program. Many of these classes are types of water allocations i.e. a water access entitlement that may be traded separately to a land title. A water allocation specifies a nominal volume (share of the available resource) and volumetric limit (maximum diversion limit in a specified time period).

### **Surface water:**

*Supplemented water allocation* means a water access entitlement that is supplied water from major instream infrastructure using a watercourse. It is tradable separate to land with priority specifications. The access to available water is equal across a given entitlement class in that water supply scheme.

*Unsupplemented water allocation with a flow condition* means a water access entitlement which includes a flow condition that specifies a passing flow requirement when taking water may commence and cease (also known as water harvesting). It is tradable separate to land. The access to available water may vary considerably across this entitlement class in a valley and so an individual LTDLE factor is required for water recovery consideration.

*Unsupplemented water allocation with no flow conditions* means a water access entitlement which does not include a flow condition which limits when taking water may commence and cease i.e. typically converted from an area-based licence. It is tradable separate to land. The access to available water may vary considerably across this entitlement class in a valley and so an individual LTDLE factor is required for water recovery consideration.

*Unsupplemented water licence with a flow condition* means a water entitlement which includes a flow condition that specifies a passing flow requirement when taking water may commence and cease (also known as water harvesting). It is attached to land and not tradable unless the owner is an entity under the *Water Act 2000* (Qld), e.g. the Commonwealth Environmental Water Holder. These entitlements do not have the Nominal Volume specification on the entitlement which is required to determine an LTDLE factor for its class. They include a water licence to take overland flow (e.g. floodplain harvesting). Access to available water may vary considerably across this entitlement class in a valley.

*Unsupplemented water licence with no flow conditions* means a water entitlement which does not include a flow condition which limits when taking water may commence and cease i.e. typically an area-based licence. It is attached to land and not tradable unless the owner is an entity under the *Water Act 2000* (Qld). These entitlements do not have the nominal volume specification on the entitlement which is required to determine an LTDLE factor for its class. Access to available water may vary considerably across this entitlement class in a valley.

### **Groundwater:**

*Unsupplemented water allocation* means a water access entitlement that accesses underground water according to the rules of the relevant water management protocol (generally no conditions apply). It is tradable separate to land.

*Unsupplemented water licence* means a water access entitlement that accesses underground water according to the rules of the relevant water management protocol (generally no conditions apply). It is attached to land and tradable to the extent of being relocatable also under the water management protocol.

## Changes in water entitlement class shares

The 2019 factors reflect the updated BDL share of each water entitlement class which may have changed since 2009. The main reasons for these BDL changes include:

- Water licences (with no nominal volumes) were converted to tradable water allocations (with nominal volumes) since the Water Plans were initially made (e.g. Gowrie and Oakey Creek in the Condamine-Balonne).
- Previously unallocated water has been allocated (e.g. unallocated water was released as a gift to the Commonwealth as an unsupplemented water allocation with flow conditions).
- Water allocation dealings associated with trading of water allocations that have moved from one Water Allocation class to another as part of the trade e.g. a water allocation with no flow condition is changed to include a flow condition to become ready for trade and hence moved between water allocation classes.

## Planning assumptions

Planning assumptions are a necessary input to the WRP's methods that demonstrate the annual permitted take will achieve the SDL in the WRP area over the long term. The methods used for Water Allocations are hydrologic models which are part of Queensland's accredited WRPs. These models were used to determine the revised estimate of the BDL.

The planning assumptions influence the determination of LTDLE factors associated with the different classes of water access entitlements in each WRP areas. In this context, the planning assumptions are critical to assessing when water recovery targets have been achieved. In Queensland, the main planning assumptions for surface water are:

- Historical climate conditions used to model water availability and use over the Basin Plan's historical climate sequence in 1895–2009 (the defined period defined for the BDL).
- Full use of all water entitlements and application of the rules governing their access to water in each water plan area.
- In the Condamine–Balonne and Queensland Border Rivers SDL resource units, the infrastructure as of September 2000 was an additional limit on the long term diversions.
- In the Paroo, Warrego, Nebine and Moonie SDL resource units, the requirement to not exceed the mean annual flow stated in their respective water plan.

This full entitlement modelling approach means that planning assumptions about utilisation factors and planted areas are not necessary or required. From a modelling perspective, the Commonwealth entitlements are treated like any other water entitlement and assumed to be fully active.

In the Border Rivers and Condamine-Balonne, the water allocations maintain diversions to the long term diversions based on the level of development at the time of the moratorium in September 2000. In the Moonie, Warrego, Nebine and Paroo catchments the water allocations allow for extraction above the level of development at the time of the moratorium but were constrained to ensure the integrity of environmental objectives are not compromised. The variation in the approach is due to the Border Rivers and the Condamine-Balonne being more highly developed than the Moonie, Warrego, Nebine and Paroo SDL resource units.

The Basin Plan also requires water to be recovered in two Queensland groundwater SDL resource units and so groundwater LTDLE factors also need to be calculated.

# How the 2019 factors were determined

## Introduction to long-term diversion limit equivalent factors

Long-term diversion limit equivalent (LTDLE) factors are determined by water availability and rules for taking water. They provide a standard currency of the long-term use of water access entitlements across the SDL resource units. For example, a water allocation with a nominal volume of 100 megalitres (ML) with an LTDLE factor of 0.8 has an expected average use of  $100 \times 0.8 = 80$  ML of water per year in the long-term.

## Underlying principles

The following key principles were used for the derivation of the 2019 factors in this report:

1. 2019 factors are based on the set of models in the accredited WRPs that are consistent with the Basin Plan BDL description.
2. The process used is repeatable, transparent and auditable.
3. The best available data were used. Where data or models were not available, assumptions made are clearly defined.
4. All water allocations for each class are treated equitably and consistently.

## Data and knowledge

The derivation of 2019 factors for surface water requires the following data and knowledge:

1. the revised estimate of the BDL volume as determined by the WRP accredited hydrological models for surface water<sup>1</sup>
2. for each class of water access entitlement:
  - a. total nominal volume, determined by adding up each Nominal Volume in that class as shown on the water allocation register
  - b. modelled mean annual diversions determined over the 1895 – 2009 historical climate sequence

The derivation of 2019 factors for groundwater requires the following data and knowledge:

1. the revised estimate of the BDL volume is equal to the BDL established under the Basin Plan
2. for each class of water access entitlement, the total Nominal Volume, determined by adding up each nominal volume in that class as shown on the water allocation register or water licence database.

---

<sup>1</sup> References to revised BDLs for Queensland SDL resource units are as follows

- Condamine-Balonne – Water Accounting Methods Report April 2019 – Table 27
- Border Rivers and Moonie – Water Accounting Methods Report April 2019 – Table 22 and 23
- Warrego-Paroo-Nebine – Water Accounting Methods Report November 2016 – Table 20, 21 and 22.



## Models

The WRP accredited hydrologic models were used to calculate the 2019 factors and supersede the previous Cap models. They are based on improved data and also, for the Condamine-Balonne and Queensland Border Rivers–Moonie WRPs, the modelling platform was changed from that used for the 2011 factors. There was no change to the access conditions of water allocations, i.e. no growth in potential take under water entitlements.

The following is a list of the scenarios developed by Queensland to support improved estimates of BDLs. It includes the model name and run numbers for each of the accredited WRPs:

- Condamine-Balonne WRP
  - Upper Condamine (1901B)
  - Middle Condamine (1901B)
  - St George (1902H)
  - Lower Balonne (1902H)
  - Oakey-Gowrie (301A)
  - Charleys Creek (1812D)
- Queensland Border Rivers–Moonie WRP
  - Queensland Border Rivers (BRS-181015A)
  - Granite Belt (GBS-181128A)
  - Moonie (MS-190207A)
- Warrego–Paroo–Nebine WRP
  - Warrego (1601A)
  - Paroo (1601A)
  - Nebine (1601A)

Hydrologic models have not been used to revise the LTDLE factors for groundwater SDL groundwater resource units. Queensland has adopted the BDL for the relevant SDL resource unit based on schedule 4 of the Basin Plan.

As described earlier in the planning assumptions chapter, the models use the ‘full use of entitlements’ modelling approach and represent the long-term diversions prior to the Australian Government’s program to recover water for environmental purposes.

The relative share of water allocation classes, their reliability and full use of annual allocations was modelled over the 1895 — 2009 climate sequence. The long-term average diversions by all the water allocations is limited by the availability of water, management rules and water allocation conditions.

A detailed description of the modelling, key assumptions and re-estimation of the BDLs is provided in the reports listed in the references chapter.

## Method

The formula to calculate the LTDLE factors for each surface water and groundwater entitlement class can generally be expressed as:

$$\text{LTDLE for an entitlement class} = \frac{\text{Long-term water diversions (BDL) by the water access entitlement class}}{\text{Volumetric share of the water access entitlement class}}$$

## Calculation steps

The following sets out the process used to calculate the 2019 factors:

**Step 1:** Categorise the modelled long-term diversions according to the water allocation class—

Classes comprise supplemented (also known as regulated) water allocations and unsupplemented (also known as unregulated) water entitlements including water allocations with and without flow conditions, overland flow water licences and groundwater entitlements.

**Step 2:** For surface water, determine long-term diversions for each water allocation class (BDL share)—

The long-term water diversions for each water allocation class is determined by running the updated model over the BDL period of 1895 – 2009. With the update of the model, all permanent trades since the release of the original water plans are reflected in the accredited WRP models. Temporary trades are not reflected as they are only for annual or sub-annual periods within approved water plan rules.

For groundwater, determine long-term diversions for each water entitlement class (BDL share)—

The long-term water diversion for each water entitlement class is equal to the total Nominal Volume in that class as shown on the water allocation register or total nominal entitlement as shown on the water licence database.

**Step 3:** Determine the volumetric share of each water entitlement class—

For supplemented and unsupplemented water allocations, this is the total nominal volume stated on the water allocation for each water entitlement class. It represents the share of the available resource. For unsupplemented water licences that are authorised to take overland flow (or floodplain harvesting), there is insufficient information to determine their share.

For water licences that authorise the take of groundwater, the volumetric share is the nominal entitlement stated on the water licence.

**Step 4:** Calculate the 2019 factor for each water entitlement class—

The LTDLE factor is calculated by dividing the BDL share by the volumetric share. For supplemented Water Allocation classes, the calculation is done collectively for each water allocation class and the 2019 factors are listed in the following tables. For unsupplemented water allocations, the calculation is done for each individual water allocation, noting the individual 2019 factors are not listed in this report (shown as 'n/a' in the following tables).

**Step 5:** Calculate the remaining volume of environmental water to be recovered—

For supplemented water allocations, multiply the nominal volume of the individual Water Allocation by the relevant 2019 factor and then group and total by water entitlement class to calculate the updated estimate of the water recovery.

For unsupplemented water allocations, multiply the nominal volume for the water entitlement class by its individual 2019 factor and then group and total by water entitlement class to calculate the updated estimate of the water recovery.

For unsupplemented water licences, multiply the nominal entitlement of the individual water licence by the relevant 2019 factor and then group and total by water entitlement class to calculate the updated estimate of the water recovery.

To determine the water recovery shortfall/remaining volume, deduct the updated estimate from the water recovery target for the respective SDL resource unit.

## Summary of 2019 long-term diversion limit equivalent factors

Table 1 shows the surface water 2019 LTDLE factors, which were determined using the above Method. LTDLE factors are only determined for supplemented water entitlement classes, as a LTDLE factor for an unsupplemented water entitlement class would be an average across the range of water allocations and not representative of individual water allocations. Consequently the LTDLE factors for unsupplemented water allocations are shown as 'n/a' in the table (and factors for individual water allocations are not shown here for privacy reasons).

The table includes factors for the following Queensland SDL resource units:

- Condamine–Balonne
- Moonie
- Queensland Border Rivers
- Warrego
- Paroo
- Nebine

**Table 1: 2019 LTDLE factors for Queensland SDL resource units (surface water)**

SDL resource unit and water entitlement class	2019		
	Nominal Volume (ML)	LTDLE factor	BDL share (ML)
<b>Condamine-Balonne (SS26)</b>			
Supplemented Water Allocation – Upper Condamine WSS – High Priority	3,387	0.997	3,377
Supplemented Water Allocation – Chinchilla Weir WSS – High Priority	1,165	1.000	1,165
Supplemented Water Allocation – St George WSS – High Priority	3,000	0.903	2,708
Supplemented Water Allocation – Maranoa River WSS – Medium Priority	805	0.724	583
Supplemented Water Allocation – Upper Condamine WSS – Medium Priority	22,328	0.899	20,073
Supplemented Water Allocation – Chinchilla Weir Water Supply Scheme – Medium Priority	2,884	0.872	2,516
Supplemented Water Allocation – St George WSS – Medium Priority	81,575	0.886	72,251
Supplemented Water Allocation – Upper Condamine WSS – Risk Class A	7,320	0.577	4,227
Supplemented Water Allocation – Upper Condamine WSS – Risk Class B	925	0.080	74
Unsupplemented Water Allocation with flow conditions	434,605	n/a	441,476
Unsupplemented Water Licence with flow conditions (overland flow / floodplain harvesting)	n/a	n/a	n/a
Unsupplemented Water Allocation with no flow conditions	41,834	n/a	36,261
<b>Queensland Border Rivers (SS4)</b>			
Supplemented Water Allocation – Border Rivers WSS – High	2,526	0.932	2,355

SDL resource unit and water entitlement class	2019		
	Nominal Volume (ML)	LTDLE factor	BDL share (ML)
Supplemented Water Allocation – Border Rivers WSS – Medium Priority	81,888	0.393	32,164
Supplemented Water Allocation – Macintyre Brook WSS – High Priority	488	0.955	466
Supplemented Water Allocation – Macintyre Brook WSS – Medium Priority	18,109	0.853	15,448
Unsupplemented Water Allocation with flow conditions	156,299	n/a	150,366
Unsupplemented Water Allocation with no flow conditions	12,460	n/a	7,420
<b>Moonie (SS25)</b>			
Unsupplemented Water Allocation with flow conditions	28,884	n/a	34,678
Unsupplemented Water Allocation with no flow conditions	884	n/a	1,614
<b>Warrego (SS28)</b>			
Supplemented Water Allocation – Cunnamulla WSS – Medium Priority	2,612	0.944	2,465
Unsupplemented Water Allocation with flow conditions	45,913	n/a	52,356
Unsupplemented Water Allocation with no flow conditions	2,090	n/a	3,736
<b>Paroo (SS29)</b>			
Unsupplemented Water Allocation with no flow conditions	50	n/a	70
<b>Nebine (SS27)</b>			
Unsupplemented Water Allocation with flow conditions	2,880	n/a	5,103
Unsupplemented Water Allocation with no flow conditions	159	n/a	157

WSS means water supply scheme

Table 1 shows the groundwater LTDLE factors for 2019, which were determined using the above Method. The table includes factors for the following Queensland SDL resource units:

- Upper Condamine Alluvium (Central Condamine Alluvium)
- Upper Condamine Alluvium (Tributaries)

**Table 2: 2019 LTDLE factors for Queensland SDL resource units (groundwater)<sup>2</sup>**

SDL resource unit and water entitlement class	2019		
	Nominal Volume (ML)	LTDLE factor	BDL share (ML)
<b>Water licence – Upper Condamine Alluvium (Central Condamine Alluvium) (GS64a)</b>			
Unsupplemented water licences	86,066	0.876	75,400
<b>Water licence – Upper Condamine Alluvium (Tributaries) (GS64b)</b>			
Unsupplemented water allocations	40,004	1.000	40,004 <sup>3</sup>

### Updated water recovery estimates

Table 3 shows the revised estimates of the volume of surface water recovered based on the 2019 LTDLE factors as at 31 March 2019 for the Condamine–Balonne, Border Rivers, Moonie, Warrego and Nebine SDL resource units. There was no requirement under the Basin Plan to recover water in the Paroo SDL resource unit.

**Table 3: Update of surface water recovery estimates based on purchased entitlements and 2019 LTDLE factors as at 31 March 2019.**

SDL resource unit and water entitlement class	2019		
	Nominal Volume (ML)	LTDLE factor	BDL share <sup>4</sup> (ML)
<b>Condamine-Balonne (SS26)</b>			
Supplemented Water Allocation – St George WSS – Medium Priority	45	0.886	40
Unsupplemented Water Allocation with flow conditions	49,754	n/a	46,885
Unsupplemented Water Licence with flow conditions (overland flow / floodplain harvesting)	-	n/a	39,072
<b>Total</b>	-	-	<b>85,997</b>
<b>Queensland Border Rivers (SS24)</b>			
Supplemented Water Allocation – Border Rivers Water Supply Scheme – Medium Priority	15,333	0.393	6,026
Supplemented Water Allocation – Macintyre Brook Water Supply Scheme – Medium Priority	207	0.853	177
Unsupplemented Water Allocation with flow conditions	8,094	n/a	8,214
<b>Total</b>	<b>23,634</b>	-	<b>14,417</b>

<sup>2</sup> The BDL shares in Table 2 are based on the original estimates of 6,000 megalitres and 3,546 megalitres for stock and domestic take in the Central Condamine Alluvium and the Tributaries respectively and used to determine the BDL and SDL in Schedule 4 of the Basin Plan. Note, these estimates have since been revised according to the method stated in the Appendix E of the Water Accounting Methods Report for the Condamine and Balonne water resource plan area.

<sup>3</sup> The BDL share for the Tributaries is based on the revised estimate of 43,550 megalitres due to a reduction of 1,950 megalitres of licenced entitlement (originally 45,500 megalitres).

<sup>4</sup> The volume stated for recovery of Unsupplemented Water Allocation with flow conditions and Unsupplemented Water Licence with flow conditions is representative of the sum of the mean annual diversion of the individual water access entitlements recovered by the Commonwealth in each class of water allocation.

<b>Moonie (SS25)</b>			
Unsupplemented Water Allocation with flow conditions	2,609	n/a	2,840
<b>Total</b>	<b>2,609</b>	-	<b>2,840</b>
<b>Warrego (SS28)</b>			
Unsupplemented Water Allocation with flow conditions	18,961	n/a	20,113
<b>Total</b>	<b>18,961</b>	-	<b>20,113</b>
<b>Nebine (SS27)</b>			
Unsupplemented Water Allocation with flow conditions	1,000	n/a	3,842
<b>Total</b>	<b>1,000</b>	-	<b>3,842</b>

Table 4 shows the revised estimates of the volume of groundwater recovered based on the 2019 LTDLE factors as at 31 March 2019 for the Upper Condamine Alluvium (Central Condamine) and Upper Condamine Alluvium (Tributaries) resource units.

**Table 4: Update of groundwater recovery estimates based on purchased entitlements and 2019 LTDLE factors as at 31 March 2019.**

SDL resource unit and water entitlement class	2019		
	Nominal Volume (ML)	LTDLE factor	BDL share (ML)
<b>Water licence – Upper Condamine Alluvium (Central Condamine Alluvium) (GS64a)</b>			
Unsupplemented water licences	35,085	0.876	30,734
<b>Total</b>	<b>35,085</b>		<b>30,734</b>
<b>Upper Condamine Alluvium (Tributaries) (GS64b)</b>			
Unsupplemented water allocations	96	1.000	96
<b>Total</b>	<b>96</b>		<b>96</b>

## Change in water recovery volumes

Table 5 below sets out the change in estimated surface water recovery volumes as at 31 March 2019. It shows the difference between applying the factors currently used in recovery reporting (i.e. 2011 LTDLE factors or interim 2017 approach for the accredited Warrego-Paroo-Nebine WRP) and 2019 LTDLE factors that have been determined in accordance with the above Method. The extent of the change in volume of recovery for each SDL resource unit is reflective of the change to the BDL share for the SDL resource unit as explained in this report and the adoption of a consistent Method to determining LTDLE factors across all SDL resource units.

**Table 5: Change in surface water recovery estimates between the revised 2019 LTDLE factors and the original 2011 LTDLE factors, as at 31 March 2019.**

SDL resource unit and water entitlement class	Nominal Volume (ML)	Recovery Volume (based on 2019 LTDLE) (ML)	Recovery Volume (based on 2011 LTDLE) <sup>5</sup> (ML)	Change in Recovery Volume (ML)
<b>Condamine- Balonne (SS26)</b>				
Supplemented Water Allocation – St George Water Supply Scheme – Medium Priority	45	40	43	-3
Unsupplemented Water Allocation with flow conditions (waterharvesting)	49,754	46,885	49,754	-2,869
Unsupplemented Water Licence with flow conditions (OLF)	n/a	39,072	37,602	1,470
<b>Total</b>	<b>49,799</b>	<b>85,997</b>	<b>87,399</b>	<b>-1,402</b>
<b>Queensland Border Rivers (SS24)</b>				
Supplemented Water Allocation – Border Rivers Water Supply Scheme – Medium Priority	15,333	6,026	5,060	966
Supplemented Water Allocation – Macintyre Brook Water Supply Scheme – Medium Priority	207	177	182	-5
Unsupplemented Water Allocation with flow conditions	8,094	8,214	8,094	120
<b>Total</b>	<b>23,634</b>	<b>14,417</b>	<b>13,336</b>	<b>1081</b>
<b>Moonie (SS25)</b>				
Unsupplemented Water Allocation with flow conditions	2,609	2,840	2,523	317
<b>Total</b>	<b>2,609</b>	<b>2,840</b>	<b>2,523</b>	<b>317</b>
<b>Warrego (SS28)</b>				
Unsupplemented Water Allocation with flow conditions	18,961	20,113	20,096	17
<b>Total</b>	<b>18,961</b>	<b>20,113</b>	<b>20,096</b>	<b>17</b>
<b>Paroo (SS29)</b>				
Not Applicable (no recovery)	-	-	-	-
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Nebine (SS27)</b>				
Unsupplemented Water Allocation with flow conditions	1,000	3,842	3,842	0
<b>Total</b>	<b>1,000</b>	<b>3,842</b>	<b>3,842</b>	<b>0</b>

<sup>5</sup> <https://www.mdba.gov.au/sites/default/files/docs/Table-1-Draft-Environmental-Water-Recovery-Estimates-as-at-31-March-2019.pdf>

**Table 6: Change in groundwater recovery estimates between the revised 2019 LTDLE factors and the original 2011 LTDLE factors, as at 31 March 2019.**

SDL resource unit and water entitlement class	Nominal Volume (ML)	2019 LTDLE factors - Volume of recovery (ML)	2011 LTDLE factors - Volume of recovery <sup>6</sup> (ML)	Change in volume of recovery (ML)
<b>Upper Condamine Alluvium (Central Condamine Alluvium) (GS64a)</b>				
Unsupplemented water licences	35,085	30,734	30,734	0
<b>Upper Condamine Alluvium (Tributaries) (GS64b)</b>				
Unsupplemented water allocations	96	96	96	0
<b>Total</b>	<b>35,181</b>	<b>30,830</b>	<b>30,830</b>	<b>0</b>

While there are some variations, there is a slight increase in water recovery estimates using the 2019 factors. This is mainly attributable to the adoption of the suite of new BDL models based on the SOURCE modelling platform and updated data.

<sup>6</sup> <https://www.mdba.gov.au/sites/default/files/docs/Table-1-Draft-Environmental-Water-Recovery-Estimates-as-at-31-March-2019.pdf>



## Amended water recovery targets

Table 7 and 8 show the current water recovery targets as a consequence of Basin Plan amendments to implement the Northern Basin Review and Queensland's request to re-distribute the shared reduction amount across its SDL resource units (under s.6.05 of the Basin Plan).

**Table 7: Current surface water recovery targets at SDL resource unit scale including Basin Plan amendments**

SDL resource unit	Local reduction amount (ML)	Requested shared reduction amount (ML)	Apportioned supply contribution (ML)	Water recovery target by SDL resource unit (ML)
Condamine-Balonne (SS26)	100,000	0	0	100,000
Queensland Border Rivers (SS24)	14,000	0	0	14,000
Moonie (SS25)	0	2,062	0	2,062
Warrego (SS28)	8,000	12,096	0	20,096
Paroo (SS29)	0	0	0	0
Nebine (SS27)	1,000	2,842	0	3,842
<b>Total</b>	<b>123,000</b>	<b>17,000</b>	<b>0</b>	<b>140,000</b>

**Table 8: Current groundwater recovery targets at SDL resource unit scale including Basin Plan amendments**

SDL resource unit	Local reduction amount (ML)	Requested shared reduction amount (ML)	Apportioned supply contribution (ML)	Water recovery target by SDL resource unit (ML)
Upper Condamine Alluvium (Central Condamine Alluvium) (GS64a)	35,400	0	0	35,400
Upper Condamine Alluvium (Tributaries) (GS64b)	3,050 <sup>7</sup>	0	0	3,050
<b>Total</b>	<b>38,450</b>	<b>0</b>	<b>0</b>	<b>38,450</b>

<sup>7</sup> As a result of the revised BDL, the maximum allowable take in the Tributaries has effectively decreased by 1,950 ML/y. With a reduction in the BDL and the SDL remaining the same, the water recovery target in this SDL resource unit decreases by 1,950 ML/y from 5,000 ML/y to 3,050 ML/y.

## Implications for water recovery

Table 9 and 10 show the implications for water recovery due to the revised 2019 LTDLE factors across the relevant SDL surface water and groundwater resource units. The tables include the extent of the change between the current reporting arrangements (i.e. 2011 LTDLE factors) and the revised 2019 LTDLE factors (and interim 2017 approach for accredited WRPs). The table is based on the changes to water recovery targets resulting from the Basin Plan amendments in 2018. Based on this analysis, the Condamine-Balonne is the only surface water SDL resource unit remaining in which the Australian Government needs to complete its water recovery.

**Table 9: Comparison of water recovery volumes between 2011 LTDLE factors and 2019 LTDLE factors – with extent of shortfall/excess recovery on water entitlements as per ‘Progress of water recovery towards Bridging the Gap by 30 June 2019 as at 31 March 2019’**

SDL Resource Unit	Local reduction amount (ML/y)	Shared reduction amount (ML/y)	Total reduction amount (ML/y)	Water recovery under 2011 factors (ML/y)	Water recovery under 2019 factors (ML/y)	Change from current (ML/y)	Local recovery shortfall / excess (ML/y)	Shared recovery shortfall / excess (ML/y)
Condamine-Balonne (SS26)	100,000	0	100,000	87,399	85,997	-1,402	-14,003	0
Qld Border Rivers (SS24)	14,000	0	14,000	13,336	14,417	1081	417	0
Moonie (SS25)	0	2,062	2,062	2,523	2,840	317	0	778
Warrego (SS28)	8,000	12,096	20,096	20,096	20,113	17	0	17
Paroo (SS29)	0	0	0	0	0	0	0	0
Nebine (SS27)	1,000	2,842	3,842	3,842	3,842	0	0	0
<b>Total</b>	<b>123,000</b>	<b>17,000</b>	<b>140,000</b>	<b>127,196</b>	<b>127,209</b>	<b>-13</b>	<b>-13,586</b>	<b>795</b>

**Table 10: Status of water recovery across the groundwater SDL resource unit based on 2019 LTDLE factors under Basin Plan amendments – as per ‘Progress of water recovery towards Bridging the Gap by 30 June 2019 as at 31 March 2019’**

SDL Resource Unit	Local reduction amount (ML/y)	Shared reduction amount (ML/y)	Total reduction amount (ML/y)	Water recovery under 2011 factors (ML/y)	Water recovery under 2019 factors (ML/y)	Change from current (ML/y)	Local recovery shortfall / excess (ML/y)	Shared recovery shortfall / excess (ML/y)
Upper Condamine Alluvium (CCA) (GS64a)	35,400	0	35,400	30,734	30,734	0	-4,666 <sup>8</sup>	0
Upper Condamine Alluvium (Tribes) (GS64b)	3,050	0	3,050	96	96	0	-2,954	0
<b>Total</b>	<b>38,450</b>	<b>0</b>	<b>38,450</b>	<b>31,030</b>	<b>31,030</b>	<b>0</b>	<b>-7,620</b>	<b>0</b>

<sup>8</sup> Following the finalisation of the recovery program for the Upper Condamine Alluvium (Central Condamine) (GS64a) SDL resource unit in August 2019, the shortfall reduced from 4,666 megalitres to 249 megalitres.

## Conclusions

This report set out the method and results for the review of LTDLE factors for the SDL resource units in the Queensland Murray-Darling Basin.

The method and data used to recalculate the 2019 factors were developed using a principle-based approach and applied in close consultation with MDBA. The results produced and documented in this report are transparent, robust and reliable, and produce an enhanced estimate of water recovery.

## References

- Border Rivers Model Calibration Volume 1 – Flow Calibration (DES, January 2019)
- Granite Belt Source Model Calibration (DES, January 2019)
- Moonie River Basin Source Model Calibration (DES, January 2019)
- Condamine-Balonne River Basin Model Volume 1 - Calibration of Hydrological Models – To St George (GS422201F) (DES, January 2019)
- Condamine-Balonne River Basin Model Volume 2 – Appendices (DES, January 2019)
- Condamine-Balonne River Basin Model Volume 3 - Calibration of Hydrological Models – Lower Balonne Distributary System (DES, January 2019)
- Border Rivers, Border Rivers Model Results to Support Basin Plan Requirements (DES, November 2018)
- Granite Belt, Granite Belt Model Results to Support Basin Plan Requirements (DES, November 2018)
- Moonie, Moonie Model Results to Support Basin Plan Requirements (DES, February 2019)
- Charley Creek, Charley Creek Model Results to Support Basin Plan Requirements (DES, November 2018)
- Lower Balonne Distributary System, Lower Balonne Distributary Model Results to Support Basin Plan Requirements (DES, December 2018)
- Middle Condamine, Middle Condamine Model Results to Support Basin Plan requirements (DES, December 2018).
- Oakey-Gowrie Creek, Oakey-Gowrie Creek Model Results to Support Basin Plan Requirements (DES, November 2018).
- St George System, St George Model Results to Support Basin Plan (DES, December 2018)
- Water Accounting Methods Report – Queensland Condamine-Balonne Water Resource Plan (DES, April 2019)
- Water Accounting Methods Report – Queensland Border Rivers-Moonie Water Resource Plan (DES, April 2019)
- Water Accounting Methods Report for the Warrego-Paroo-Nebine Water Resource Plan (DES, November 2016)
- Upper Condamine, Upper Condamine Model Results to Support Basin Plan Requirements (DES, November 2018)